

Weatherization *Plus*



Opportunities for the 21st Century

Millennium Committee Strategy Report
April 1999

In October 1998, the Weatherization network formed a *Millennium Committee* to study how the program might address national priorities in concert with a vision for the Weatherization Program in the year 2000 and beyond.

The Committee commissioned and discussed a set of six draft white papers describing potential linkages with:

- advanced technology
- Partnership for Advancing Technology in Housing (PATH)
- Climate Change
- Million Solar Roofs
- community sustainability
- electric industry restructuring

Committee members participated in a series of conference calls and in development of a strawman consolidated strategy paper, for discussion with the entire Weatherization network in early March 1999. The Committee subsequently revised the draft to sharpen its focus and set aside details for subsequent implementation planning. This document represents the Committee's proposal for Weatherization *Plus*.

Weatherization *Plus*

A house is a dynamic structure, a system of interconnected components. The performance of each component affects the operation of many others. To successfully address the energy, comfort, and health and safety needs of a dwelling, the whole house must be evaluated from top to bottom, including the building envelope, mechanical systems, baseloads, indoor air quality, and occupants, as well as the interaction of these components. This constitutes a whole-house approach to energy efficiency.

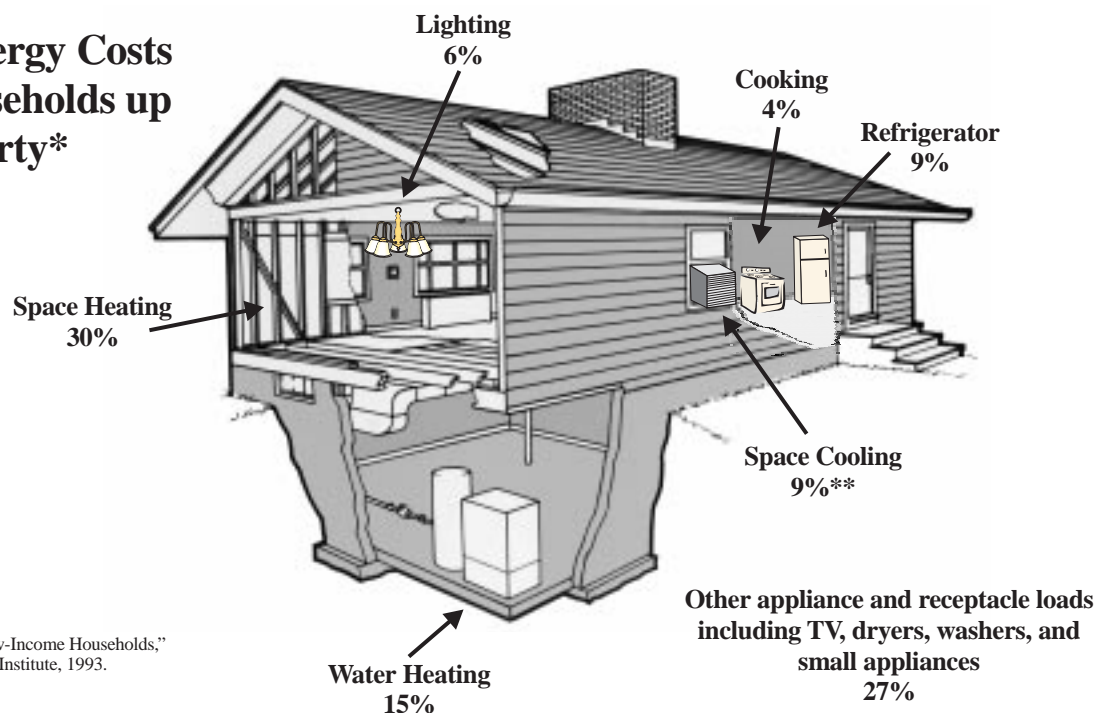
The Department of Energy's (DOE) Weatherization Assistance Program currently focuses on reducing heating and cooling costs in homes of low-income families, while ensuring the safe operation of the building equipment. **By expanding the scope of the Program to adopt a whole-house approach, incorporating advanced energy efficiency technologies, Weatherization can:**

- Achieve significantly greater energy savings;
- Further reduce emissions of air pollutants and greenhouse gases;
- Increase the leveraging potential of the Weatherization network; and
- Expand the program's contribution to the economic health and sustainability of the nation's communities.

The nationwide network of Weatherization service providers has collaborated with DOE to propose this expanded program scope, as a way to better achieve the core mission of the Weatherization Program. DOE recognizes that this approach will not only improve energy savings in low-income housing, but also will contribute to the goals of other national priorities including the Partnership for Advancing Technology in Housing (PATH), clean air initiatives and climate change mitigation, electric industry restructuring, and community livability.

This enhanced concept for DOE's Weatherization Assistance Program is called **Weatherization *Plus***. The strategy for fulfilling its promise is laid out in the following pages. Detailed implementation plans will be developed in accordance with this strategic direction.

Percent of Total Energy Costs by End-Use in Households up to 150% Poverty*



*Source: "The Energy Usage and Needs of Low-Income Households,"
Prepared by Economic Opportunity Research Institute, 1993.

**For households with air conditioners

Goal

The Weatherization *Plus* goal is **to achieve more energy savings in more low-income homes**. The intent is to reinforce the fundamental principle of ensuring equitable access by our nation's neediest households to the benefits of energy efficiency technologies. The already high level of energy efficiency services rendered to low-income households will be improved by:

- Strengthening the network;
- Increasing current activities; and
- Expanding opportunities for linkage with other programs and funding sources.

This will increase energy savings and further reduce household energy costs per dollar invested, and expand the number of households served.

The Weatherization Program provides energy efficiency investments to low-income families. **The typical low-income household spends about 14.5 percent of its income on home energy; this is more than four times the comparable figure of 3.5 percent for an average American household.** Although 4.7 million homes have been weatherized since the program's inception, this represents only 16 percent of the 29 million Weatherization-eligible households (Figure 1).

The network of local Weatherization agencies has successfully managed DOE dollars and the funding leveraged from housing programs, energy bill assistance programs, utilities, landlords, and other sources, to weatherize an annual average of over 200,000 homes over the 22 years since the program's inception. (Figure 2).

“The goal is to not only grow the program but expand the reach.”

Dan Reicher, Assistant Secretary,
Energy Efficiency and Renewable Energy

Figure 1
Homes Weatherized Represent 16%
of Total Eligible Stock

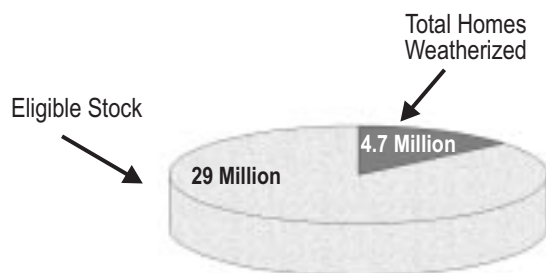
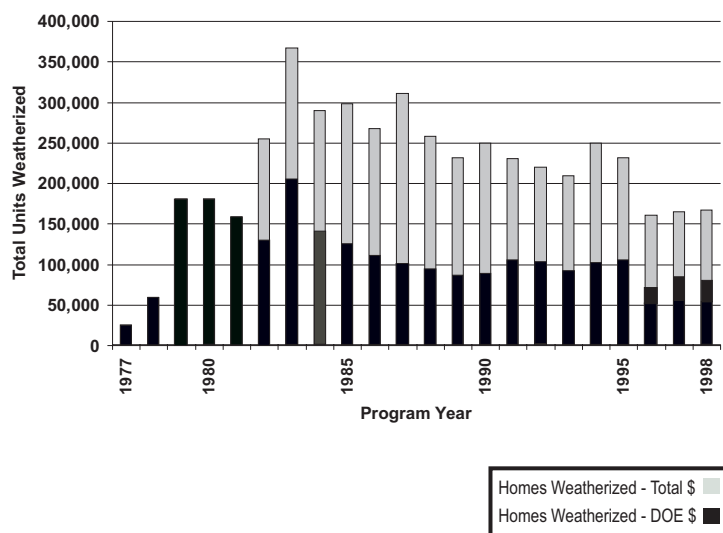


Figure 2
Weatherization Assistance Program Dwelling Units Completed



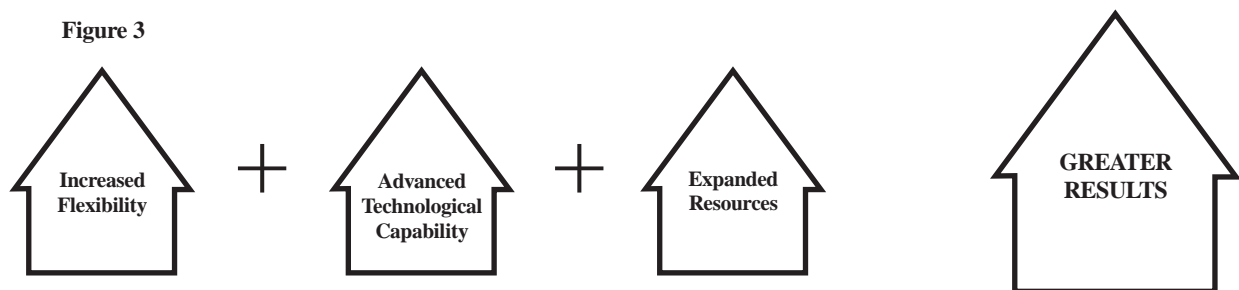
Weatherization Mission:

To reduce energy costs for low-income families, particularly the elderly, people with disabilities, and children, while ensuring their health and safety.

Strategy

DOE is now prepared to strengthen the core of the program and enable it to effectively reach more low-income homes by addressing a broader array of energy efficiency measures. Strategies for doing this need to be implemented in accordance with a two-stage plan, based on resources available today and resources required in the future. **With the resources currently available to the Weatherization Program, DOE can lay the foundation for the integration of the whole-house approach through increased flexibility and begin equipping the network with advanced technological capabilities. With additional resources, DOE can fully integrate the whole-house approach and achieve the goal of Weatherization *Plus*.**

There are three basic strategies that must be pursued together:



Increase Flexibility

The intent is to strengthen and expand the Program by adding flexibility in order to better empower state and local agencies to define and meet their own unique needs. This must be done while ensuring that families which most need the assistance will continue to be served by the Program. Providing this flexibility will involve:

- Regulatory and possibly statutory changes;
- Dissemination of information on complementary federal programs and new technologies; and
- Creation of an improved environment for partnering.

Advance Technological Capabilities

Expanding the scope of the Program to a whole-house approach will require an integrated strategy of training and technical assistance. With this assistance, the state and local Weatherization agencies will be able to:

- Increase the technical base of the Program, supplementing the already established standards of practice by training more staff; and
- Expand the standards through additional measures for the benefit of the clients of other DOE and other federal programs.

In addition, technical resources from other DOE energy efficiency programs, such as Rebuild America, Building America, and ENERGY STAR®, can provide new information and technology applications for the Weatherization Program.

Expand Resources

Ensuring the successful achievement of the goals of Weatherization *Plus* will require a restoration of core funding. This funding provides the foundation for the core activities of the program: it provides the knowledge base and skills to achieve the program's goals, to participate in and to enhance other national and community efforts, and to leverage additional resources, e.g., utility, state, and landlord contributions. In addition, new resources must be accessed to integrate additional activities into the Program. These resources include new funding from utility restructuring activities, community-based initiatives, and increased appropriations.

History

The U.S. Department of Energy's Weatherization Assistance Program is the nation's program for delivering energy efficiency services to low-income Americans. Weatherization was created during the 1973 Arab oil embargo to assist low-income families who lacked the resources to respond to price or regulatory signals by investing in efficiency. In the beginning, temporary measures like plastic storm windows, weatherstripping, and caulking were installed by volunteer labor. **The Program has evolved into one in which professional staff use sophisticated energy audit protocols and advanced diagnostic equipment to determine which cost-effective measures and services should be installed to achieve the greatest energy efficiency and cost payback.** Throughout the evolution of this Program, Weatherization has remained committed to its fundamental mission.

Why We Will Succeed

As a result of technological and operational improvements in the program, energy savings per household and the value of each dollar invested have improved consistently (Figures 4 and 5). The cost-benefit ratio of the Program has increased from 1.6 in 1989 to 2.4 in 1996. In addition to the financial and health and safety benefits which accrue to the low-income families served, the Program decreases the need for fuel assistance payments, creates and supports jobs, reduces fossil fuel use and the related environmental consequences, and prolongs the life of housing stock. **Incorporating a whole-house approach will multiply the proven success of the Weatherization Program.**

Figure 4
Average Reduction In Energy
Used For Space Heating*

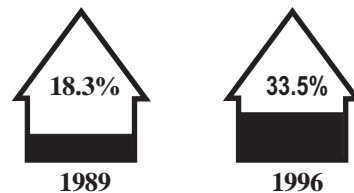


Figure 5
Increase In Average Annual
Energy Savings Per Dwelling*

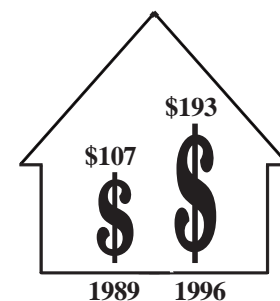


Figure 6
Weatherization Produces Energy Savings
and Non-Energy Benefits

| Type of Non-Energy Impact | Net Value of the Impact per Dwelling (1989\$) |
|---|---|
| Enhanced Property Value and Extended Lifetime of Dwelling | \$126 |
| Reduced Fires | \$3 |
| Reduced Arrearages | \$32 |
| Federal Taxes Generated from Direct Employment | \$55 |
| Income Generated from Indirect Employment | \$506 |
| Avoided Costs of Unemployment Benefits | \$82 |
| Environmental Externalities | \$172* |
| Total Net Value of Non-Energy Impacts | \$976 |

* The net present value of the environmental benefits was calculated assuming a 4.7% discount rate and a 20-year lifetime. The other non-energy benefits occur only in the year (1989) in which weatherization occurred and, therefore, do not require discounting.**

*Source: *Progress Report of the National Weatherization Assistance Program*, Oak Ridge National Laboratory, ORNL/CON-450, September 1997
—for natural gas heated homes

**Source: *National Impacts of the Weatherization Assistance Program in Single-Family and Small Multifamily Dwellings*, Oak Ridge National

Resources

Weatherization providers have consistently demonstrated their ability to deliver high quality, cost-effective residential energy efficiency services including many non-energy benefits (Figure 6). The Weatherization Program, with its established infrastructure and presence, now has the opportunity to expand upon work that is currently taking place and to integrate energy efficiency with housing and environmental programs. **The technical expertise gained over the last twenty-five years, coupled with experience as the primary source of energy efficiency assistance for low-income families, empowers local agencies to deliver a wider array of services. Local agencies can bridge the service gap between federal, state, and community programs and agencies.**

Figure 8
Local Weatherization Agencies

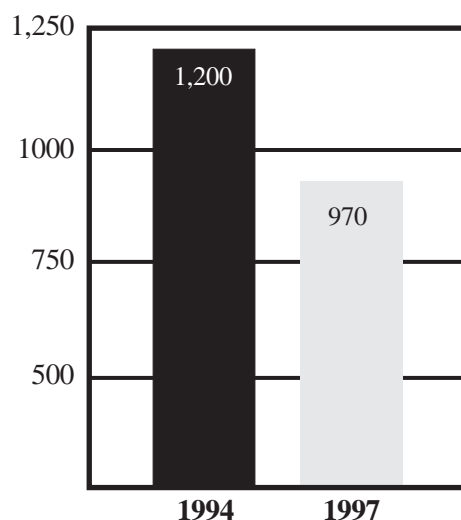
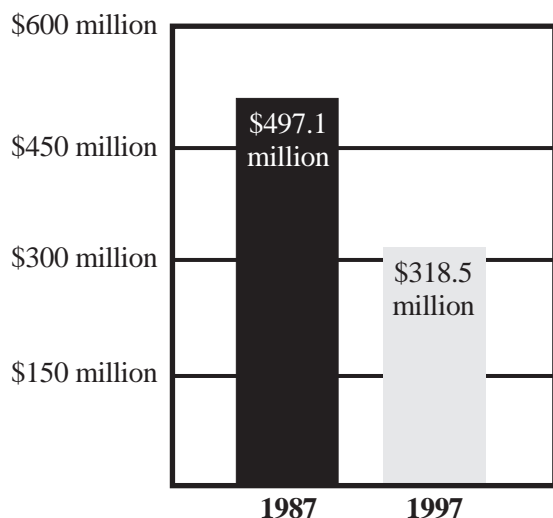


Figure 7
Total Weatherization Funding From All Sources



Professionalism and innovation have grown since the inception of the Program and average savings per household have improved dramatically. However, funding and thus production have diminished alarmingly in recent years (Figure 7). The Weatherization network has responded to the funding cutbacks with creativity, maintaining DOE's high standards, but the stretch in resources has sharply constrained the network's ability to grow in new directions and participate in community-wide initiatives. Funding limitations have undermined the network's ability to sustain highly skilled technical and program staff, thus threatening to diminish the technological improvements that boosted the Program's cost-effectiveness so dramatically from 1989 to 1996 (Figure 8).

Weatherization agencies service every county in every state across the nation.

Network Capabilities

- Weatherization providers are in thousands of homes all over the country and have immediate opportunity to deliver services of other federal programs and initiatives via this established network.
- The technical resources in the network include diagnostic/remediation skills developed for existing housing.
- Weatherization agencies already meet standards of quality, safety, and energy efficiency that are above building code practices.
- The network's capabilities in representing, organizing, coordinating, and implementing low-income programs can play a critical role in the design of community building efforts based on equitable service to the poor.
- State and local Weatherization network representatives are key advocates for low-income consumer protections in the utility restructuring process.

Local Agencies Working Toward Sustainable Communities

Neighborhood Services of Toledo, Inc. (NHS) stands out as a model of how organizations serving low-income families can creatively combine energy efficiency initiatives to serve broader community development aims. NHS delivers Weatherization services and is also a very active Rebuild America partner. As part of NHS's Rebuild America efforts, the agency is developing new affordable housing using modular five-star designs with assistance from DOE's Building America Program. NHS has hosted at least one workshop for building developers and architects on ENERGY STAR® products, bringing in representatives of EPA's ENERGY STAR® Homes program. NHS also is actively engaged in downtown redevelopment.

In the Ohio Home Weatherization Assistance Program, direct economic benefits were found to exceed the cost of the program by 7 to 26 percent.

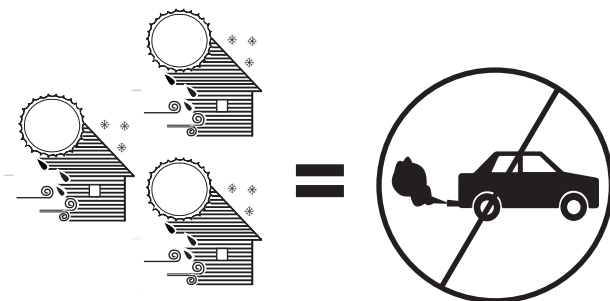


Figure 9
Reduction in annual carbon emissions in every three weatherized houses equals the annual emissions of one U.S. car.

Today's Initiatives

The Weatherization Program intends to strengthen the core of the program and expand its reach by integrating the whole-house approach to energy efficiency. Given the financial recovery that has yet to occur in the Weatherization network since the federal budget cuts of 1996, DOE cannot impose unfunded mandates for additional activities. **However, with the resources currently available in the FY99 budget and requested in the FY2000 budget, DOE can lay the foundation for integrating the whole-house approach.**

The following DOE actions are essential:

- Initiate appropriate regulatory and legislative changes to increase flexibility needed for the whole-house approach.
- Initiate development and/or revisions of audit instruments to reflect the whole-house approach.
- Enhance technical capabilities of Weatherization providers by accessing the national laboratories, contractors, and industry partners that support DOE programs such as Rebuild America, Building America, and ENERGY STAR®. Enlist their support to develop and disseminate practical information to the Weatherization network on installation, financing, maintenance, etc. of cost-effective, advanced technologies through Regional Support Offices, conferences, and web sites.
- As a matter of policy, require that all DOE-supported, community-oriented deployment programs (e.g., Rebuild America, ENERGY STAR®, Building Codes training, the State Energy Program, Affordable Housing Partnerships, Clean Cities, EnergySmart Schools, and other community partnerships) equitably address low-income communities. Also, require coordination between state, local, and utility partners who receive DOE funding for other technical assistance or joint research projects, and their counterpart Weatherization agencies.
- Develop and disseminate information to the network on the range of DOE and other federal programs, explaining what they offer and identifying the minimum resources the states would need to "bring to the table" in order to participate.
- Assess air pollution impacts of measures that are or will be incorporated into the Program and design ready-to-use templates for expressing the impact of a typical Weatherization retrofit on emissions. This will lay the foundation for Weatherization participation in emissions trading systems.

Advanced Technologies

Weatherization measures have evolved from emergency fixes and low-cost activities, such as weatherstripping and caulking, to sophisticated techniques involving advanced diagnostics and targeted technologies. Advanced energy audits are now used in 47 states.

With the arrival of new affordable energy efficiency technologies, the potential for significantly increasing energy savings has expanded. **Technologies such as advanced duct sealing and balancing, condensing gas furnaces, and heat pump water heaters have potential for integration in Weatherization. These new technologies also create environmental and health and safety benefits by reducing emissions, improving air quality, and increasing occupant comfort.** Integrating these technologies through the Weatherization Program will complement the efforts of several governmental initiatives including PATH, Climate Change, and Million Solar Roofs. Integrating advanced technologies in the Weatherization Program will also raise the profile of the network and open new possibilities for partnering in other low-income programs and private business opportunities.

Partnership for Advancing Technology in Housing (PATH)

PATH is a public/private partnership initiated by the White House in early 1997 to accelerate the development and deployment of new technologies in the American housing industry. PATH links key federal agencies with home builders, manufacturers, insurance companies, financial corporations, regulators, and other organizations related to the housing industry.

PATH has an ambitious retrofit component that directly intersects with the mission and activities of the Weatherization Program. PATH seeks to reduce energy use by 30 percent or more in at least 15 million existing homes by the year 2010. As the largest single energy efficiency program for existing buildings, Weatherization can make a substantial “down payment” on the PATH goal. Combining these efforts would produce more opportunities for savings and greater coordination of retrofit opportunities for the low-income population. With additional technical training funded by PATH, the Weatherization network would increase its technical profile and improve delivery capabilities. A partnership with PATH could create opportunities for the network to expand capabilities in energy management systems.

(Continued from page 7)

- Implement a formal agreement with PATH principals that low-income housing will be equitably addressed by the initiative, and propose that the Weatherization network will act as the primary PATH deliverer to existing housing stock. Keep the network fully informed on the PATH initiative and on potential areas of cooperation and funding opportunities.
- Access the available PATH funds to assess effectiveness of certain technologies in achieving 30 percent savings in existing housing based on the considerable retrofit experience of the Weatherization Program. Leverage resources to implement pilot projects utilizing the network as a “test bed” for the most cost-effective advanced technologies and best practices promoted through PATH.
- Update documentation of energy savings through Weatherization measures, highlighting instances where total energy use is reduced by 30 percent or more, and aggregating total energy savings regionally.
- Support network training in utility restructuring issues through national, regional, and state meetings for peer exchange and technical assistance.
- Work with ally organizations such as the National Association of State Utility Consumer Advocates and National Council of State Legislators to ensure they address the need for low-income energy efficiency as part of their restructuring agenda.

North Carolina Agency Partners to Develop Resources and Capabilities

The Choanoke Area Development Association (CADA), a local Weatherization provider in North Carolina, is the lead agency in the Roanoke-Chowan **Rebuild America Partnership**. The CADA Weatherization staff are heavily involved in the multi-million dollar renovation of a historic school building into apartments for the elderly. They are being trained as “Building Owner Agents” and will audit the buildings, interact with lenders on financing, secure vendors from a qualified pool, and commission the building. They will be compensated on a fee-for-service basis built into the retrofit financing package and funded by the energy savings. This concept could provide a significant opportunity for Weatherization agencies nationwide.

Tomorrow's Advances

To fully advance the integration of the whole-house approach in the Weatherization Program, the network will require additional technical and financial resources. **The restoration of core funding will play a critical role in fortifying the network and achieving tomorrow's opportunities.** In addition, DOE must seek additional appropriations to promote tomorrow's advances, as well as new opportunities for leveraging resources with other federal programs, community initiatives, and private activities.

With restored funding, the Weatherization network will:

- Rebuild the technical staff capabilities in existence before the 1996 budget cuts.
- Increase technical skill capacity through nationally consistent training at regional conferences, increased subscription to training facilities and services, and expanded training through peer exchange.
- Bolster staff capacity to collaborate with other organizations in community-wide approaches to solving the energy problems of low-income families.
- Resume former production levels to diminish the growing waiting lists of eligible clients needing Weatherization services.

With additional funding, the Weatherization network will:

- Integrate advanced technologies into the existing Program infrastructure and service network, including increased engineering support and formal field training.
- Collaborate with national laboratories and private industry on the development, adaptation, and integration of appropriate, cost-effective advanced technologies for use in Weatherization.
- Support network-wide acquisition of advanced diagnostic tools and the necessary equipment and materials to deliver advanced energy efficiency technologies.

(Continued on page 10)

Baseload Measures Produce Significant Savings

A pilot refrigerator replacement project in New York State demonstrated that refrigerator replacement can be effectively integrated into Weatherization operations and that the incremental administrative cost for adding this service is small. Sponsored by the New York State Energy Research and Development Authority, the New York State Division of Housing and Community Renewal, and the Rochester Gas and Electric Company, the project achieved savings of over 74 percent under three diverse scenarios. The savings-to-investment ratios ranged from 1.81 to 4.65, and average annual savings ranged from \$73.19 to \$213.66.

Electric Industry Restructuring

The key relationship between electric industry restructuring and the Weatherization Assistance Program is one of dollars and cents for low-income programs.

Restructuring activities have the direct potential of adding to the program resources of the network, through public benefit funds. Weatherization network representatives have been effective participants in the electric industry restructuring debate at state and local levels. Such participation, and funding for this participation, is authorized and encouraged by Energy Policy Act of 1992 at Sections 112 and 142. In a number of states, these revenues will help fund weatherization of additional houses and enable agencies to integrate advanced technologies.

***Reductions in fuel bills
through Weatherization
reduce the contribution
required of ratepayers.***

Air Pollution

Air pollution is a global economic, environmental, and health issue. The United States has recognized the critical importance of improving air quality to benefit the health of its citizens, industries, and economy. The 1990 U.S. Clean Air Act requires significant reductions in sulfur dioxide and nitrogen oxides by utilities. The United Nations' Kyoto Protocol on climate change commits industrialized nations to reducing emissions of greenhouse gases an average of 5 percent below 1990 levels beginning in 2008. Increasing energy efficiency is key to meeting air pollution reduction goals, and the Weatherization Assistance Program is positioned to make major contributions to this effort.

A typical U.S. house produces 6,252 pounds of carbon annually. Through Weatherization, carbon emissions are reduced by 990 pounds annually (one-third the annual emissions of an average automobile - Figure 9, page 6). In addition, the reduced demand for power by weatherized households decreases electricity generation and further decreases the levels of pollution. Increased energy efficiency not only helps utilities avoid sulfur dioxide emissions but other pollutants as well, including nitrogen oxide, carbon dioxide, toxins, and particulates.

(Continued from page 9)

- Use the results of studies and pilots to adjust energy audit and diagnostic procedures so that agencies can properly assess appropriate conditions for installing advanced technologies.
- Increase emission-reducing services by expanding to other energy-efficient appliances, such as refrigerators, air conditioners, water heaters, and lighting retrofits.
- Significantly increase educational and advocacy activities to ensure the low-income receive an equitable share of the benefits resulting from energy industry restructuring. Shape any enhanced energy efficiency initiatives coming out of restructuring to maintain focus on the neediest low-income clientele.
- Pursue pilot efforts, information tracking, and other innovative market practices and peer exchange to stimulate the aggregation of energy loads so that the low-income may benefit from the energy price breaks usually reserved for large industrial concerns.

| Cumulative Benefits from 2000 - 2010 | | | |
|--|------------------------|-------------------------|-------------------------|
| | Current Funding Levels | Restored Funding Levels | Expanded Funding Levels |
| Homes Served | 770,000 | 1,300,000 | <i>Plus</i> |
| Energy Savings (trillion Btu) | 132 | 223 | <i>Plus</i> |
| Present Value of Client Dollar Savings (1999 \$) | \$818 Million | \$1,381 | <i>Plus</i> |
| Carbon Emission Reduction (million metric tons) | 1.9 | 3.1 | <i>Plus</i> |

Conclusion

With both *Today's Initiatives* and *Tomorrow's Advances*, the beneficiaries are not only the low-income clients served by this Program, but the communities across the nation in which these families live. The Weatherization Program works where the programs intersect – at the community level.

The commitments made by DOE and the Weatherization network involve the principles at the core of the sustainable community development of economic health, environmental protection, and enhanced quality of life for low-income families. **Through adoption of Weatherization *Plus*, not only low-income clients, but also communities across the nation directly benefit by ensuring:**

- Hundreds of thousands of low-income families are in safe, affordable housing;
- Local agencies across the country employ and train thousands of technical staff; and
- Measurable amounts of carbon, nitrogen oxide, and sulfur dioxide emissions are reduced with every house weatherized.

By expanding the reach of this Program, Weatherization *Plus* activities will:

- Result in more efficient, healthier, and livable communities;
- Reduce the “export” of local energy dollars out of the community;
 - low-income communities spend more than 20 percent of their gross income on energy and up to 80 percent of it immediately leaves the community
- Create jobs by keeping more money in the local economy;
 - a conservative estimate is that every retained dollar produces three dollars in multiplier benefits
- Increase the industrial and commercial base within the community;
- Improve local air quality and reduce adverse health effects, particularly asthma; and
- Encourage inner city development and discourage sprawl.

Weatherization *Plus* is good news for the nation's poor.

Weatherization *Plus* is good news for the nation's communities.

Summary

While preserving the core mission of the Program, the Weatherization network will embrace opportunities to cost-effectively increase average energy savings achieved in each home weatherized by taking a **whole-house approach** to improving energy efficiency. This includes incorporating a broader spectrum of more advanced, cost-effective technologies and providing a comprehensive solution to energy needs within a household. This will make the Weatherization Program a valued partner for implementation of national PATH goals and other national priorities.

Adoption of a broader community approach to the energy-related problems of low-income households will further help to leverage additional resources and increase the total number of low-income families receiving Weatherization services, while enhancing the sustainability of the communities where they live.

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The Millennium Committee is made up of 30 representatives from state and local Weatherization agencies and the U.S. Department of Energy, with support provided by DOE staff and contractors. The Weatherization network owes them a debt of gratitude for their time, dedication, and the high caliber of their contributions.

Local Agency Representatives

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